Fossil Mollusca from the Utsutoge Formation, Iide-machi, Nishiokitama-gun, Yamagata Prefecture, Japan

Tohoku Univ., Sci. Rep., 2nd ser. (Geol.), Special Volume, no. 6 (Hatai Memorial Volume), p. 157–162, 1 table, pl. 14, February 25, 1973

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Abstract

Thirty species of fossil marine molluscs among which 4 new species are described from the Late Miocene Utsutoge Formation in southwest Yamagata Prefecture. Brief notes are given on the geology and paleoecology.

INTRODUCTION

The occurrence of Mollusca from the Utsutoge Formation has been known since Morita (1930) recorded some fossil shells, and subsequently Yabe and Hatai (1941), Tokunaga and Tanai (1954) and Minakawa (1954) reported some species of Mollusca from the same formation.

The material upon which this paper is based was collected from the grayish-white sandy tuff of the Utsutoge Formation, exposed along the middle course of the Shirakawa River and also its tributary the Utsuzawa, Iide-machi, Nishiokitama-gun, Yamagata Prefecture. The fossil localities are the left cliff or bank of the Shirakawa River and the roadside cutting, about 300 m northwest of Nishitakamine and a road-cliff, about 600 m east of Utsuzawa, both situated in the south of the Tenoko Railway Station on the Yonesaka Line.

The collection was made by the present writer in collaboration with Mr. Yasuo Honda of the Yonezawa City Office, and Mr. Nobuo Murakawa of the Yamagata Prefecture Museum, in the autumn of 1968 at the request of the Yamagata Prefecture Museum. The fossils are now preserved in the collection of that museum.

ACKNOWLEDGMENTS

The writer expresses his hearty thanks to Prof. Kotora Hatai, Institute of Geology and Paleontology, Faculty of Science, Tohoku University, for his kind advice and reading the manuscript. Thanks are also due to Messrs. Kimiji Kumagai and Shohei Otomo of the same Institute for their photographic works and Mrs. Kimiko Shibuya for typing the manuscript.

BRIEF NOTES ON THE GEOLOGY

The geology of the district has been studied by Hikoji Morita (1930) and subsequently by Toshihiko Abe (1953), who were then students of the Tohoku University, Sendai, and subsequently by Shigemoto Tokunaga and Toshimasa Tanai (1964), geologists of the Geological Survey of Japan, and Hokkaido University, Shinya Minakawa (1959) of the

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Yamagata University, and by the present writer and his collaborators, Yasuo Honda of the Yonezawa City Office and Ryoichi Tamiya of the Yamagata Prefecture Government Office.

The stratigraphic sequence of the Tertiary deposits, developed along the Shirakawa River is as follows in descending order.

1. Nakahara Formation: Mainly composed of conglomerate, about 150 m in thickness.
2. Tenoko Formation: Alternation of conglomerate, sandstone and mudstone, intercalated with lignite, and interbedding thin layers of white tuff at its basal part, about 300 m in thickness.
3. Takamine Formation: Alternation of conglomerate, tuffaceous sandstone and siltstone or mudstone, partly cross-bedded, intercalating several layers of workable lignite, about 200 m in thickness.
4. Utsutoge Formation: Tuffaceous sandstone and sandy tuff in the lower part, and an alternation of medium to coarse grained tuffaceous sandstone and tuffaceous mudstone in the upper part, about 500 m in thickness.
5. Yugoya Formation: Dark gray mudstone, intercalated with andesite lava at the lower part and grayish white tuff and tuffaceous sandstone at the basal portion, about 300 m in thickness.
6. Kusaitoge Formation: Mainly composed of an alternation of mudstone or siltstone, alternately intercalated with tuff in the lower part, and also with andesite and basalt lava, about 400 m in thickness.
7. Dakeya Formation: Mainly composed of acidic tuffaceous rocks, interbedding andesite and dacite lavas, more than 500 m in thickness.
8. Budosawa Formation: Conglomerate, sandstone and tuff, intercalating propylite and dacite lava, about 300 m in thickness.

——————————— Unconformity ———————————

9. Granitic rocks and pre-Tertiary formations.

The fossils collected from the Utsutoge Formation as a whole, are all from the upper part of the formation, distributed along the Shirakawa River. In this area the upper part consists mainly of rather medium grained, light-green to grayish white colored sandy tuff or tuffaceous sandstone, often with pumice pebbles. The rocks show a very young aspect, and have yielded not only molluscan remains, but also echinoids, sandpipes, pieces of silicified wood and drifted plant leaves (*Salix* spp.) etc.

THE MOLLUSCAN FAUNA AND GEOLOGIC AGE

The preservation of the fossils is not good, almost of all the original shells have been dissolved and the majority occur as casts or moulds.

The distinguished molluscs are shown in the following Table.

From the table, the molluscs collected from the northeast of Nishitakamine amount to 25, but from the east of Utsuzawa only six species were found. Among the total 30 distinguished molluscs, seven are specifically indeterminable, 12 are extinct, of which four are new species or subspecies, and the remaining 11 are still living in the seas of Japan. More than half of the living species are shallow water froms and almost of all living species have been recorded from the seas of north Honshu, Japan.

The molluscan fossils mentioned above closely resembles the fossil shells from the Shell Bed, in the vicinity of Ogino, Yama-gun, Fukushima Prefecture (Nomura, 1935). The present fauna contains characteristic species, such as *Mizuhopecten kimurai* and *Nanaochlamys notoensis otutumiensis*. From the fossil fauna, the writer considers that the geologic age of the Utsutoge Formation is Late Miocene and from the characteristics of the genera and species composing the faunal assemblage, it is considered that deposition took place in shallow water and that the sea-water temperature may have been somewhat colder than the recent sea at the same latitude.

Table 1. Molluscan species of the Utsutoge Formation (* illustrated).

Specific Name \ Locality	I	II
Yoldia (Cnesterium) yabei Yokoyama	2	
Glycymeris sp.	1	
Mizuhopecten kimurai (Yokoyama)	1	
M. sp.		1
Nanaochlamys notoensis otutumiensis (Nomura and Hatai)		1
Taras (Fellaniella) ustus (Gould)	1	
Conchocele nipponica (Yabe and Nomura)	1	
Lucinoma murakawai Zinbo, n. sp.*		10+
Fulvia sp.	1	
Clinocardium iwasiroense (Nomura)*	1	
C. californiense (Deshayes)*	1	
C. ciliatum (Fabricius)	1	
C. sp.		1
Serripes laperousii (Deshayes)*	1	
Meretrix uzenensis Zinbo, n. sp.*	1	
Spisula grayana (Schrenck)	1	
Fabulina pallidula (Lischke)	1	
Macoma tokyoensis Makiyama*	3	
M. calcarea (Gmelin)	4	
Tellina cf. *protovenulosa* Nomura	1	
T. sp.		1
Mya urusikuboana Nomura*	1	
Tectonatica janthostomoides Kuroda and Habe	5	3
T. janthostomoides yamagatana Zinbo*, n. subsp.	2	
Trophonopsis hondai Zinbo, n. sp.*	1	
Siphonalia sp.	1	
Buccinum leucostoma Lischke	1	
B. sinanoense Makiyama*	1	
Gemmulifusus ? sp.	1	
Plicifusus yanamii (Yokoyama)*	1	

Locality I-Left bank of the Shirakawa River, about 300 m northwest of Nishitakamine; II-Road-cliff, about 600 m east of Utsuzawa; 1, 2-number of specimens.

SYSTEMATIC DESCRIPTION OF NEW SPECIES

Family Lucinidae

Genus *Lucinoma* Dall, 1901

Lucinoma murakawai Zinbo, n. sp.

Pl. 14, figs. 2a, 2b

Shell small, inflated, more or less obliquely suborbicular, somewhat inequilateral, equivalve with a slightly depressed posterior region, anterior margin arcuated, posterior margin broadly rounded, beak rather prominent, lunule unknown. Sculpture consists of distinct regularly concentric striae with intermediate concentric fine lines.

Dimensions of the type specimen (mould): – Height 25 mm, length 29 mm, depth of both valves 11 mm.

Comparison: – This new species is somewhat related to *Lucinoma adamsiana* Habe (1961, p. 125, pl. 56, fig. 27), a living species of Japan, but is distinguished from it by the larger, more flattened shell, less rounded anterior margin, with more distinct striae.

Remarks: – The species is named in honor of N. Murakawa, who joined the writer in collection of the fossils.

Type locality: – East of Utsuzawa, Reg. No. 127.

Family Veneridae
Genus *Meretrix* Lamarck, 1779
Meretrix uzenensis Zinbo, n. sp.
Pl. 14, fig. 1

Shell rather small, broadly trigonal, inequilateral. Anterior and posterior ends rounded, posterior end narrower than anterior, ventral margin evenly and broadly arcuated, dorsal margin sloping with nearly straightly both in front and behind beak, anterior dorsal margin about one half as long as posterior margin. Beak prominent, raised above hinge line. Surface sculptured with weak concentric undulations. Lunule and escutcheon not observed.

Dimensions of the monotype specimen (mould of the right valve): – Height 29 mm, length 38 mm.

Comparison: – *Meretrix parameretrix* Nomura (1938, p. 257, pl. 34, figs. 11a, 11b), from the Tatsunokuchi Shell Bed in Sendai, Miyagi Prefecture closely resembles the present new species, but is distinguished from it by the less curved and longer ventral margin and lower shell.

Type locality: – Northwest of Nishitakamine, Reg. No. 110.

Family Naticidae
Genus *Tectonatica* Sacco, 1890
Tectonatica janthostomoides yamagatana Zinbo, n. subsp.
Pl. 14, figs. 9a, 9b

Shell large, obliquely globose, spire rather high, apical whorls lost, body whorl very large, base rounded. Remaining whorls about four, more or less shouldered, rounded below, separated by distinct channeled sutures, sculpture not observable due to its state of preservation. Aperture obliquely large, anterior corner broadly rounded and posterior somewhat narrowly rounded.

Dimensions of the type specimen: – Height more than 51 mm, diameter 46 mm.

Comparison: – *Tectonatica janthostomoides* Kuroda and Habe, figured by Kira (1959, p. 41, pl. 17, fig. 18), is closely allied to this new subspecies in general shape, but is distinguished from it, by having highly spired shell, distinct channeled sutures and larger aperture.

Type locality: – Northwest of Nishitakamine, Reg. No. 118.

Family Muricidae
Genus *Trophonopsis* Bucquoy, Dautzenberg and Dollfus, 1880
Trophonopsis hondai Zinbo, n. sp.
Pl. 14, figs. 11a, 11b, 11c

Shell small, ovate-fusiform, with spire somewhat shorter than body-whorl, whorls more than four, apical or younger ones lost, suture obscure. Whorls moderately shouldered, shoulder somewhat concave, below slightly convex, provided with longitudinal ribs and spiral cords. Ribs 19 on body-whorl, rounded, separated by somewhat narrower interspaces, but on penultimate whorl are nearly equal to interspaces. Body whorl more or less convex on the lateral side, suddenly contracted at base. Aperture ovate, end of canal lost, but apparently short.

Dimensions of monotype specimen: – Height more than 24 mm, diameter of body-whorl 16.5 mm.

Comparison: – *Trophon solitarius* Yokoyama (1925, p. 6, pl. 1, fig. 12) from Shigarami, Kamiminouchi-gun, Nagano Prefecture, closely resembles the present new species in outline and sculpture, but is distinguished from it by having larger shell, weaker shoulder

and more radial ribs, *Trophon toyamai* Hatai and Nisiyama (1938, p. 256, text-figs. 3, 4), from the Wakimoto Formation of Tanuma, Yamamoto-gun, Akita Prefecture, is another allied form, but is distinguished from the present one by the weaker shoulder and less number of radial ribs.

Remarks: – The species is named in honor of Y. Honda, who joined the writer in collection of the fossils.

Type locality: – Northwest of Nishitakamine, Reg. No. 118.

REFERENCES

Abe, T., 1953, Geology in the west region of Yonezawa, Yamagata Prefecture. *Graduation Thesis, Inst. Geol. Pal. Tohoku Univ.*, Sendai. (MS. *in* Japanese).

Habe, K., 1961, Coloured illustrations of the shells of Japan, II. *Hoikusha Publ. Co.*, Osaka, Japan. (*in* Japanese).

Hatai, K., and Nisiyama, S., 1936, Notes on two species of Gastropoda. *Biogeogr. Soc. Jap., Bull.*, v. 8, no. 16, p. 253–257, 4 text-figs.

————, and ————, 1952, Check list of Japanese Tertiary marine Mollusca. *Tohoku Univ., Sci. Rep., 2nd ser. (Geol.), Spec. Vol.*, no. 3, p. 1–464.

Kira, T., 1959, Coloured illustrations of the shells of Japan (Enlarged and Revised Edition). *Hoikusha Publ. Co.*, Osaka, Japan. (*in* Japanese).

Kuroda, T., 1931, Fossil Mollusca. *In* F. Honma, Shinano Chubu Chishitsushi (*Geology of Central Shinano*), pt. 4, p. 1–90, pls. 1–13. (*in* Japanese).

Masuda, K., 1960, On the morphogenesis of *Nanaochlamys*. *Tohoku Univ., Sci. Rep., 2nd ser. (Geol.), Spec. Vol.*, no. 4, p. 272–283, pl. 39.

————, 1963, The so-called *Patinopecten* of Japan. *Pal. Soc. Jap., Trans. Proc. N.S.*, no. 52, p. 145–153, pls. 22, 23.

Minakawa, S., 1959, Stratigraphical and paleontological studies on the Neogene formations in the surrounding areas of the Yonezawa basin (pt. 1). *Geol. Soc. Jap., Jour.*, v. 65, no. 765, p. 363–373. (*in* Japanese).

Morita, H., 1930, Geology and topography of the Tertiary deposits in the vicinity of Oguni-machi, Nishiokitama-gun, Yamagata Prefecture. *Graduation Thesis, Inst. Geol. Pal., Tohoku Imp. Univ.*, Sendai. (MS. *in* Japanese).

Nomura, S., 1935a, On some fossil Mollusca from northeast Honsyu, Japan, Pt. I. Fossil Mollusca from the vicinity of the Narusawa hot spring, northwestern part of the Kurikoma volcano, Iwate-ken. *Saito Ho-on Kai Mus., Res. Bull.*, no. 5, p. 71–100, pls. 3, 4.

————, 1935b, Fossil Mollusca from the vicinity of Ogino, Yama-gun, Hukusima-ken. *Saito Ho-on Kai Mus., Res. Bull.*, no. 5, p. 101–125, pls. 5–7.

————, 1937, On some fossils from along the upper course of the Nikkogawa, Akumi-gun, Yamagata-ken, northeast Honsyu, Japan. *Saito Ho-on Kai Mus., Res. Bull.*, no. 13, p. 173–178, pl. 24.

————, 1938, Molluscan fossils from the Tatunokuti shell beds at Goroku cliff in the western border of Sendai. *Tohoku Imp. Univ., Sci. Rep., 2nd ser. (Geol.)*, v. 19, no. 2, p. 235–275, pls. 33–36.

————, and Hatai, K., 1936, Fossils from the Tanagura beds in the vicinity of Town Tanagura, Hukusima-ken, northeast Honsyu, Japan. *Saito Ho-on Kai Mus., Res. Bull.*, no. 10, p. 109–155, pls. 13–17.

————, and ————, 1937, A list of the marine Mollusca and Brachiopoda, collected from the region, lying north of the Nanakita river in the vicinity of Sendai, Rikuzen province, Japan. *Saito Ho-on Kai Mus., Res. Bull.*, no. 13, p. 121–146, pls. 17–21.

Shikama, T., 1964, Index fossils of Japan. *Asakura-shoten Co.*, Tokyo, Japan. (*in* Japanese).

Tokunaga, S., and Tanai, T., 1954, On the geologic structure and coal seams in Okitama lignite field in Yamagata Prefecture. *Monthly Rep., Geol. Surv. Japan*, no. 5, p. 31–38. (*in* Japanese).

Yabe, H., and Hatai, K., 1941, The Cenozoic formations and fossils of northeast Honsyu, Japan. *Tohoku Imp. Univ., Sci. Rep., 2nd ser. (Geol.)*, v. 12, no. 1, p. 30–39.

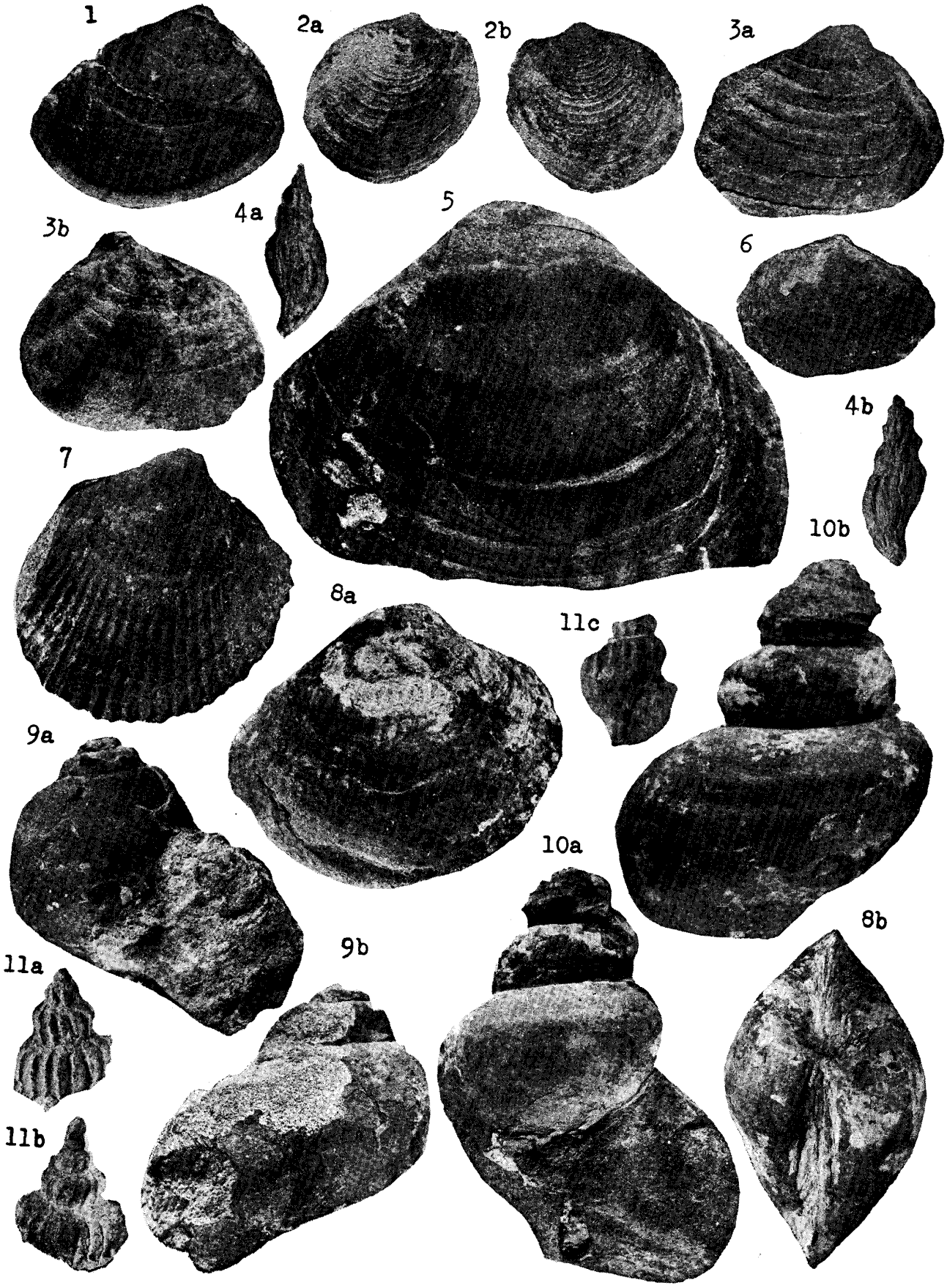
Yokoyama, M., 1920, Fossils from the Miura Peninsula and its immediate north. *Tokyo Imp. Univ.*,

Coll. Sci., Jour., v. 39, art. 6, p. 1–193, pls. 1–20.
————, 1924, Molluscan remains from the lowest part of the Jo-ban coal-field. *Tokyo Imp. Univ., Coll. Sci., Jour.*, v. 45, art. 3, p. 1–22, pls. 1–5.
————, 1925a, Molluscan remains from the uppermost part of the Jo-ban coal-field. *Tokyo Imp. Univ., Coll. Sci., Jour.*, v. 45, art. 5, p. 1–34, pls. 1–6.
————, 1925b, Tertiary Mollusca from Shinano and Echigo. *Tokyo Imp. Univ., Fac. Sci., Jour., sec. 2*, v. 1, pt. 1, p. 1–23, pls. 1–7.
————, 1926, Fossil shells from Sado. *Tokyo Imp. Univ., Fac. Sci., Jour., sec. 2*, v. 3, pt. 8, p. 249–312, pls. 32–37.

Plate 14

(All in natural size)

Fig. 1. *Meretrix uzenensis* Zinbo, n. sp.
Figs. 2a, 2b. *Lucinoma murakawai* Zinbo, n. sp.
Figs. 3a, 3b. *Mya urusikuboana* Nomura
Figs. 4a, 4b. *Plicifusus yanamii* (Yokoyama)
4b. Internal cast.
Fig. 5. *Serripes laperousii* (Deshayes)
Fig. 6. *Macoma tokyoensis* Makiyama
Fig. 7. *Clinocardium iwasiroense* (Nomura)
Figs. 8a, 8b. *Clinocardium californiense* (Deshayes)
Figs. 9a, 9b. *Tectonatica janthostomoides yamagatana* Zinbo, n. subsp.
Figs. 10a, 10b. *Buccinum sinanoense* Makiyama
Figs. 11a, 11b, 11c. *Trophonopsis hondai* Zinbo, n. sp.
11a, Model of external surface. 11b, Cast. 11c, Internal mould of body-whorl.



Kumagai and Otomo photo.